

FORM PTO-1390 (Modified)  
(REV 10-95)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

## TRANSMITTAL LETTER TO THE UNITED STATES

1884

DESIGNATED/ELECTED OFFICE (DO/EO/US)

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

CONCERNING A FILING UNDER 35 U.S.C. 371

10/019862

INTERNATIONAL APPLICATION NO.  
PCT/EP 00/04045INTERNATIONAL FILING DATE  
MAY 6, 2000PRIORITY DATE CLAIMED  
MAY 12, 1999

## TITLE OF INVENTION

APPARATUS FOR PASSING A MIXTURE OF FLUIDS THROUGH HUMAN AND/OR ANIMAL ORGANS OR  
EXTREMITIES

## APPLICANT(S) FOR DO/EO/US

Georg MATHEIS

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
  - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☒ has been transmitted by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☐ A copy of the International Search Report (PCT/ISA/210).
8. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
  - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ have been transmitted by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☐ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

## Items 13 to 18 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.  
A **SECOND** or **SUBSEQUENT** preliminary amendment.
16. ☐ A substitute specification.
17. ☐ A change of power of attorney and/or address letter.
18. ☒ Certificate of Mailing by Express Mail
19. ☐ Other items or information:

ET 473 367542 US

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

INTERNATIONAL APPLICATION NO.

ATTORNEY'S DOCKET NUMBER

10/019862

PCT/EP 00/04045

1884

20. The following fees are submitted:

**BASIC NATIONAL FEE ( 37 CFR 1.492 (a) (1) - (5) ) :**

- ☐ Search Report has been prepared by the EPO or JPO ..... \$930.00
- ☐ International preliminary examination fee paid to USPTO (37 CFR 1.482) ..... \$720.00
- ☐ No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) ..... \$790.00
- ☒ Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... \$1,070.00
- ☐ International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) ..... \$98.00

**ENTER APPROPRIATE BASIC FEE AMOUNT =**

\$1,040.00

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).

\$0.00

| CLAIMS             | NUMBER FILED | NUMBER EXTRA | RATE      |
|--------------------|--------------|--------------|-----------|
| Total claims       | 9 - 20 =     | 0            | x \$18.00 |
| Independent claims | 1 - 3 =      | 0            | x \$80.00 |

\$0.00

\$0.00

Multiple Dependent Claims (check if applicable). ☐

\$0.00

**TOTAL OF ABOVE CALCULATIONS =**

\$1,040.00

Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) (check if applicable). ☒

\$520.00

**SUBTOTAL =**

\$520.00

Processing fee of \$130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)).

\$0.00

**TOTAL NATIONAL FEE =**

\$520.00

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). ☐

\$0.00

**TOTAL FEES ENCLOSED =**

\$520.00

Amount to be:

refunded

\$

charged

\$

- ☐ A check in the amount of \_\_\_\_\_ to cover the above fees is enclosed.
- ☒ Please charge my Deposit Account No. **19-4675** in the amount of **\$520.00** to cover the above fees.  
A duplicate copy of this sheet is enclosed.
- ☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **19-4675** A duplicate copy of this sheet is enclosed.

**NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.**

SEND ALL CORRESPONDENCE TO:

**STRIKER, STRIKER & STENBY**  
103 EAST NECK ROAD  
HUNTINGTON, NEW YORK 11743

SIGNATURE

**MICHAEL J. STRIKER**

NAME

**27233**

REGISTRATION NUMBER

**NOVEMBER 9, 2001**

DATE

10/019862

531 Rec'd PC

09 NOV 2001

UNITED STATES PATENT AND TRADEMARK OFFICE

Examiner:

Group:

Attorney Docket # 1884

Applicant(s) : MATHEIS, G.

Serial No. :

Filed :

For : APPARATUS FOR PASSING A MIXTURE OF  
LIQUIDS THROUGH...

SIMULTANEOUS AMENDMENT

November 9, 2001

Honorable Commissioner of Patents and Trademarks  
Washington, D.C. 20231

S I R S:

Simultaneously with filing of the above identified application  
please amend the same as follows:

In the Claims:

Cancel all claims without prejudice.

Substitute the claims attached hereto.

REMARKS:

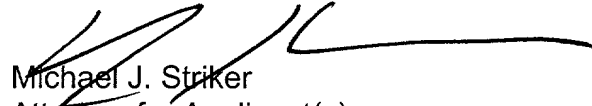
This Amendment is submitted simultaneously with filing of the above identified  
application.

With the present Amendment applicant has amended the claims so as to eliminate  
their multiple dependency.

RECEIVED  
NOV 14 2001  
UNITED STATES PATENT AND TRADEMARK OFFICE

Consideration and allowance of the present application is most respectfully requested.

Respectfully submitted,

  
Michael J. Striker  
Attorney for Applicant(s)  
Reg. No. 27233

20250123 14:00:00

Claims:

1. An apparatus (10) for passing a mixture of liquids, preferably mixtures of blood and medications, through human  
5 and/or animal organs or extremities, having at least one pump device (11) for recirculating the liquids and having at least one mixing unit (14), characterized in that the at least one mixing unit (14) has at least two chamber wheels (17, 18) for metered mixing of the liquids.

10 2. The apparatus (10) of claim 1, characterized in that the mixture ratio of the liquids is adjustable via the diameter ratio and/or the chamber size and/or the rotary speed of the chamber wheels (17, 18).

15 3. The apparatus (10) of claim 1 [or 2], characterized in that the pressure and the volume flow of the liquids are adjustable.

20 4. The apparatus (10) of [one of claims 1-3] claim 1, characterized in that the two chamber wheels (17, 18) are coupled in terms of their drive.

25 5. The apparatus (10) of claim 4, characterized in that the chamber wheels (17, 18) are each supported on two independent shafts and are connected by a gear.

30 6. The apparatus (10) of claim 4, characterized in that the chamber wheels (17, 18) are supported on a common shaft.

7. The apparatus (10) of [one of claims 1-6] claim 1, characterized in that the at least one mixing unit (14) and the



Claims:

1. An apparatus (10) for passing a mixture of liquids, preferably mixtures of blood and medications, through human  
5 and/or animal organs or extremities, having at least one pump device (11) for recirculating the liquids and having at least one mixing unit (14), characterized in that the at least one mixing unit (14) has at least two chamber wheels (17, 18) for metered mixing of the liquids.

10 2. The apparatus (10) of claim 1, characterized in that the mixture ratio of the liquids is adjustable via the diameter ratio and/or the chamber size and/or the rotary speed of the chamber wheels (17, 18).

15 3. The apparatus (10) of claim 1, characterized in that the pressure and the volume flow of the liquids are adjustable.

20 4. The apparatus (10) of claim 1, characterized in that the two chamber wheels (17, 18) are coupled in terms of their drive.

25 5. The apparatus (10) of claim 4, characterized in that the chamber wheels (17, 18) are each supported on two independent shafts and are connected by a gear.

6. The apparatus (10) of claim 4, characterized in that the chamber wheels (17, 18) are supported on a common shaft.

30 7. The apparatus (10) of claim 1, characterized in that the at least one mixing unit (14) and the at least one pump device (11) are combined in a unit.

8. The apparatus (10) of claim 1, characterized in that  
the at least one pump (11) is a centrifugal pump.

9. The apparatus (10) of claim 1, characterized in that  
5 the at least one pump is pressure- regulated or flow-regulated.

44367001



1/PRTS

10/019862

531 Rec'd PC... 09 NOV 2001

APPARATUS FOR PASSING A FLOW THROUGH HUMAN AND/OR ANIMAL  
ORGANS OR EXTREMITIES

Specification:

5 The invention relates to an apparatus for passing a  
mixture of liquids, preferably mixtures of blood and  
medications, through human and/or animal organs or  
extremities, having at least one pump device for  
recirculating the liquids and having at least one mixing  
unit.

10 Until now, as an apparatus for passing a mixture of  
liquids through human and/or animal organs or extremities, a  
system of hoses and cannulas has been known, in which the  
mixture of blood and medications is attained via two roller  
pumps. However, this apparatus cannot be used except by  
15 cardiology technicians and is therefore usable only for  
applications involving cardiac and vascular surgery. Another  
apparatus of this type is named in European patent disclosure  
EP 0 855 192 A2, in which blood and medications run into a  
container from which they are delivered to an infusion  
20 cannula. However, this apparatus is very complicated in its  
overall layout. Moreover, this apparatus does not generate a  
continuous flow, which can lead to supply problems for the  
organ or extremity to be perfused.

25 The object of the invention is to propose an apparatus  
of the type defined at the outset, which can be used by any  
physician after only brief instruction and in which  
continuous perfusion of the organ or extremity is assured.

The invention attains this object with an apparatus for

passing a mixture of liquids, preferably mixtures of blood and medications, through human and/or animal organs or extremities, having at least one pump device for recirculating the liquids and having at least one mixing unit; the at least one mixing unit has at least two chamber wheels for metered mixing of the liquids.

The desired mixture ratio of the liquids is adjustable via the diameter ratio and/or the chamber size and/or the rotary speed of the chamber wheels. Once the corresponding chamber wheels have been selected, it is assured that the mixture ratio of the liquids is constant. Accordingly the apparatus can be used immediately, after only brief training of those who are to use it. If varying the mixture ratio is desired, then the chamber wheels of the mixing unit can be exchanged for those with the appropriate diameter ratio, or the rotary speed ratio of the chamber wheels can be changed.

Advantageously, the pressure and the volume flow of the liquids can be adjustable.

To assure that the liquids to be mixed will always be mixed at the desired mixture ratio by the two chamber wheels, these wheels can be coupled in terms of their drive.

The chamber wheels can be each supported on two independent shafts and connected by a gear. The gear ratio of the gear then determines the desired mixture ratio, along with the diameter and the chamber size of the wheels. If the gear is a shiftable gear, the mixture ratio can be varied accordingly by a quick manual operation. However, for the sake of coupling them in terms of their drive, the chamber wheels can be disposed on a common shaft.

To make the apparatus compact and easy to handle, the at least one mixing unit and the at least one pump device can be combined in a unit.

Advantageously, the at least one pump can be a centrifugal pump, which in particular recirculates blood substantially more gently than a roller pump, for instance, does.

To prevent fluctuations of pressure or flow, which could possibly interfere with the flow through the organ or the extremity, the at least one pump can preferably be pressure-regulated or flow-regulated.

One exemplary embodiment of an apparatus according to the invention will be described below in further detail, in conjunction with the accompanying drawing.

The sole drawing figure shows a basic sketch of an apparatus 10 for passing a mixture of liquids, preferably mixtures of blood and medications, through human and/or animal organs or extremities. The apparatus 10 has a pump device 11, with which blood is aspirated from the body via a line 12 and sent on to a mixing unit 14 via a line 13. A container 15 contains a pharmaceutical solution, which is sent on to the mixing unit 14 via a line 16. The mixing unit 14 has two chamber wheels 17 and 18. The two chamber wheels 17 and 18 have different diameters; the ratio of the two diameters determines the mixture ratio of the blood and the pharmaceutical solution. If one wishes to vary the mixture ratio, then the chamber wheels 17 and 18 of the mixing unit 14 can be replaced with other chamber wheels with a suitable diameter ratio. The two chamber wheels 17 and 18 are coupled to one another in terms of their drive via a common shaft 19.

The shaft 19 thus assures that the mixture ratio remains unchanged. The volume of blood and medication metered by the mixing unit 14 is put together in a branch 20 and thus finally mixed. This mixture is then carried to the organ or extremity through which it is to flow.

It is understood that the two chamber wheels 17 and 18 can also be disposed on separate shafts and coupled via a gear.

Claims:

1. An apparatus (10) for passing a mixture of liquids, preferably mixtures of blood and medications, through human and/or animal organs or extremities, having at least one pump device (11) for recirculating the liquids and having at least one mixing unit (14), characterized in that the at least one mixing unit (14) has at least two chamber wheels (17, 18) for metered mixing of the liquids.

2. The apparatus (10) of claim 1, characterized in that the mixture ratio of the liquids is adjustable via the diameter ratio and/or the chamber size and/or the rotary speed of the chamber wheels (17, 18).

3. The apparatus (10) of claim 1 or 2, characterized in that the pressure and the volume flow of the liquids are adjustable.

4. The apparatus (10) of one of claims 1-3, characterized in that the two chamber wheels (17, 18) are coupled in terms of their drive.

5. The apparatus (10) of claim 4, characterized in that the chamber wheels (17, 18) are each supported on two independent shafts and are connected by a gear.

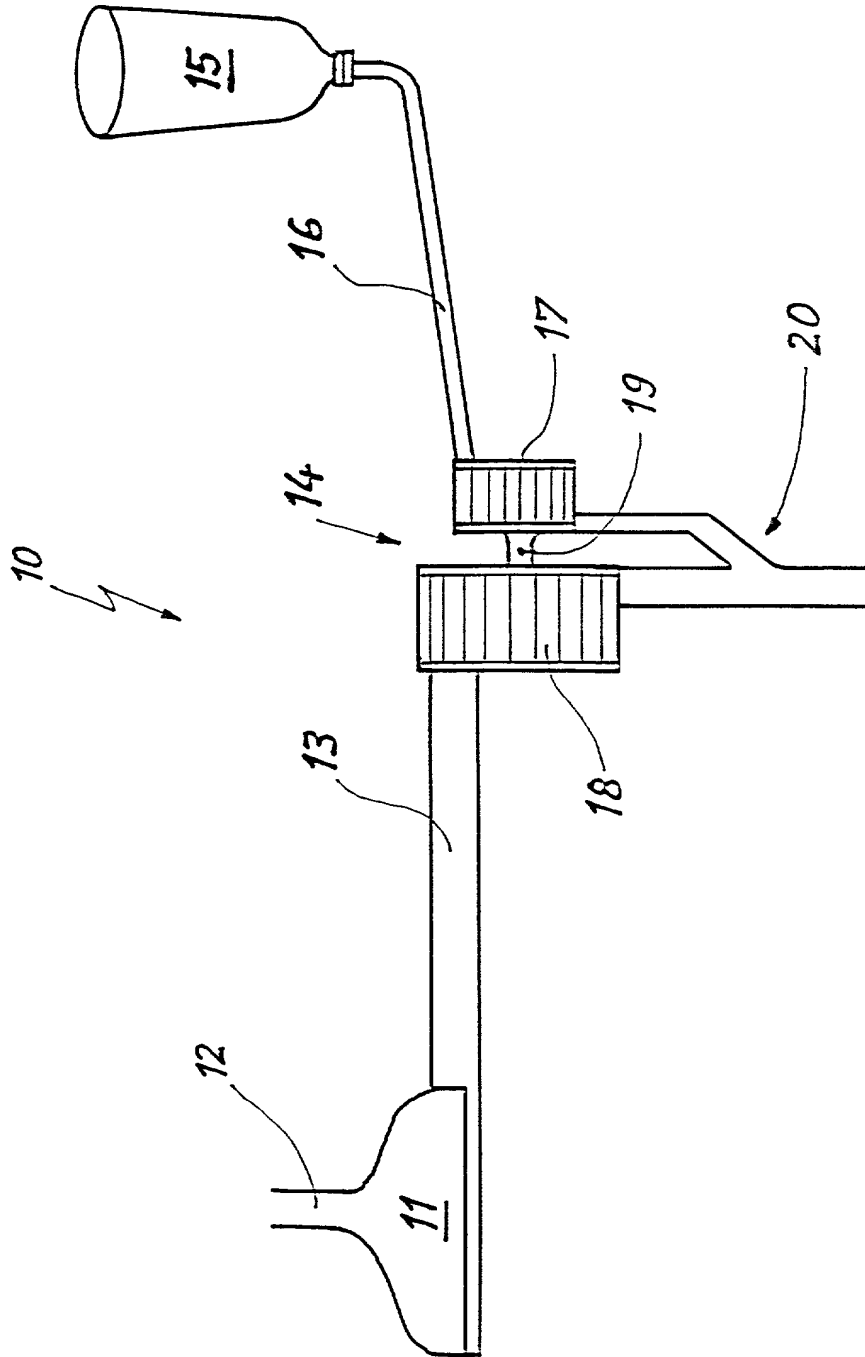
6. The apparatus (10) of claim 4, characterized in that the chamber wheels (17, 18) are supported on a common shaft.

7. The apparatus (10) of one of claims 1-6, characterized in that the at least one mixing unit (14) and

the at least one pump device (11) are combined in a unit.

8. The apparatus (10) of one of claims 1-7, characterized in that the at least one pump (11) is a centrifugal pump.

9. The apparatus (10) of one of claims 1-8, characterized in that the at least one pump is pressure-regulated or flow-regulated.



**DECLARATION AND POWER OF ATTORNEY FOR NATIONAL STAGE OF PCT PATENT APPLICATION**

As a below-named inventor, I hereby declare that:

Georg MATHEIS

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **APPARATUS FOR PASSING A MIXTURE OF LIQUIDS THROUGH HUMAN AND/OR ANIMAL ORGANS AND EXTREMITIES** the specification of which was filed as PCT International Application number PCT/EP 00/04045 on May 6, 2000.

I hereby state that I believe the named inventor or inventors in this Declaration to be the original and first inventor or inventors of the subject matter which is claimed and for which a patent is sought.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365 (b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior foreign application(s):

Priority claimed:

|                             |                             |                             |               |               |
|-----------------------------|-----------------------------|-----------------------------|---------------|---------------|
| <u>199 22 015.8</u>         | <u>GERMANY</u>              | <u>MAY 12, 1999</u>         | <u>X</u>      |               |
| (Number)                    | (Country)                   | (Date filed)                | Yes           | No            |
| <u>                    </u> | <u>                    </u> | <u>                    </u> | <u>      </u> | <u>      </u> |
| (Number)                    | (Country)                   | (Date filed)                | Yes           | No            |

As a named inventor, I hereby appoint the following attorney to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

/ Michael J. Striker, Reg. No. 27233

Direct all telephone calls to Striker, Striker & Stenby at telephone no.: (631) 549 4700 and address and all correspondence to:

STRIKER, STRIKER & STENBY  
103 East Neck Road  
Huntington, New York 11743  
U.S.A.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such wilful false statement may jeopardize the validity of the application or any patent issued thereon.



|   |                        |  |
|---|------------------------|--|
| Signature:  | Date:<br>Dec. 06, 2001 | Residence and Full Postal Address:<br>Hainer Chaussee 24 Fidelisstr. 26<br>63303 Dreieich 72393 Burladingen<br>Germany DEX |
| Full Name of First or Sole Inventor:<br>Georg MATHEIS | Citizenship:<br>GERMAN |  |
| Signature:  | Date:                  | Residence and Full Postal Address:   |
| Full Name of Second Inventor:                         | Citizenship:           |  |
| Signature:  | Date:                  | Residence and Full Postal Address:   |
| Full Name of Third Inventor:                          | Citizenship:           |  |
| Signature:  | Date:                  | Residence and Full Postal Address:   |
| Full Name of Fourth Inventor:                         | Citizenship:           |  |
| Signature:  | Date:                  | Residence and Full Postal Address:   |
| Full Name of Fifth Inventor:                          | Citizenship:           |  |
| Signature:  | Date:                  | Residence and Full Postal Address:   |
| Full Name of Sixth Inventor:                          | Citizenship:           |  |
| Signature:  | Date:                  | Residence and Full Postal Address:   |
| Full Name of Seventh Inventor:                        | Citizenship:           |  |
| Signature:  | Date:                  | Residence and Full Postal Address:   |
| Full Name of Eighth Inventor:                         | Citizenship:           |  |
| Signature:  | Date:                  | Residence and Full Postal Address:   |
| Full Name of Ninth Inventor:                          | Citizenship:           |  |